U.S. Department
of Transportation

**Federal Aviation
Administration**

Advisory Circular

Subject: Change 1 to SPECIFICATION FOR TAXIWAY AND RUNWAY SIGNS

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Change: 1

1. PURPOSE. This change adds a requirement to the qualification tests and deletes the prohibition on unlighted swinging signs. The change number and date of change is shown at the top of each page. The changed material is indicated by asterisks in the margins.

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4.8.2 Qualification Tests. All tests contained in 4.8.3, 4.8.4, and 4.8.5 are applicable for certification.

4.8.3 General Tests.

4.8.3.1 Visual Examination. For this test, Type L-858Y signs shall have at least two message elements separated by a message divider, Type L-858R signs shall have a legend which reads ``18- 36," and Type L-858L signs shall have a legend which reads ``B." The signs shall be examined for compliance with the requirements for dimensions, materials, component ratings, materials, finish, and quality of workmanship. Signs shall be viewed in daylight from a distance of 800 ft (244 m). The sign type, as defined in paragraph 1.2.1, should be readily identifiable. The sign face and retroreflective material shall appear to be smooth and shall be free of any aberration (except at the panel joints of modular signs). Legend and/or background colors on modular signs shall be continuous across panel joints. Signs shall be viewed from a distance of 800 ft (244 m) at nighttime to determine if the luminance level is sufficient to make the Type L-858Y and L-858R background colors, and Type L-858L legend and border color readily discernible, or in the case of distance remaining signs to determine if the legend is readily discernible. Style 2 and Style 3 signs shall be viewed while the input current is varied throughout the range on which the sign is to operate. Modular signs shall then be viewed from a distance of 200 feet (61 m) with the sign at full brightness. The panel joints shall not interfere with the legibility of the sign nor leak light which would cause a discontinuous color across the joint.

4.8.3.2 Wind Load and Frangibility Test. The signs shall be tested for their ability to withstand loads of 200 mph (322 km/h) without damage. The test shall be performed with sign completely assembled and mounted by the base assembly. If the loading is applied with the sign mounted on a vertical surface, the weight of the sign shall be included as part of the total applied weight. The test shall be designed to ensure the legend panel received the full load. Spring mounted signs designed to swing shall be locked to prevent movement during the test. A static load of 0.9 psi (621 kPa) shall be applied uniformly over the entire surface of the legend panel for a period of 10 minutes. The sign shall not break at the frangible points nor suffer permanent distortion. The static load shall then be increased until the sign breaks at the frangible points. The breaking shall occur before the loading reaches an applied static load over the legend panel of 1.3 psi (8.96 kPa). The legend panel and panel supports shall then be inspected for evidence of damage. Any breakage or deformation shall be cause for rejection. Note: Spring mounted signs may alternatively be tested according to the procedure in 4.8.3.3.

4.8.3.3 Spring Mounted Signs. With the legend panel protected, the sign shall be tested for frangibility according to 4.8.3.2. The sign shall then be unlocked and subjected to Pbreak (the pressure at which the frangible points break). The sign face swing angle, 0, caused by the pressure, Pbreak, shall be measure. The pressure, Pswing, shall then be computed as follows: Pswing = Pbreak x (Cosine 0). With the sign relocked and the legend panel protection removed, the Pswing shall be applied uniformly over the entire surface of the legend panel for 1 minute. The legend panel and panel supports shall than be inspected for evidence of damage. Any breakage or deformation shall be cause for rejection.

4.8.4 Photometric Test.

4.8.4.1 Photometer Parameters. A foot-candle meter or telephotometer shall be used for this test. Before testing, photometric equipment shall be calibrated in accordance with IES LM-52. The foot-candle meter shall be calibrated to measure luminance and shall have a 6-inch (150 mm) long collimating luminance adapter tube (black on the inside) placed between the sign and the meter. The telephotometer shall be well color-corrected and calibrated to measure luminance. Either system shall be designed to measure a ``spot" on the sign face of 1.5 inches (38.1 mm) in diameter. Light emitted only from the sign shall be permitted to reach either meter. Style 2 and Style 3 signs shall be tested at each input current **throughout the range on which the sign is to operate.**

4.8.4.2 Sign Types and Sizes. Photometric testing shall be conducted on size 1, 2, and 3 for each of Type L-858Y, L-858R and L-858L signs. If the luminaire design of a double face sign is symmetrical for both faces, then only one face should be tested. The length of Types L-858Y and L-858R to be tested shall be at least 45 inches (1140 mm). Signs employing modular construction shall contain at least two modules for this test.

4.8.4.3 Sign faces. Type L-858Y and L-858L signs shall have an entirely yellow sign face made from the same material used to create the background on production L-858Y signs or the legend and border on production L-858L signs, respectively. Type L-858R signs shall have an entirely white sign face made from the same material used to create the legend on production L-858R signs.

4.8.4.4 Measurements. Measurements shall be made on a 3 inch (76 mm) grid over the entire face of the sign, with no measurement being closer than 3 inches (76 mm) to the sign frame. The average of all measurements shall fall between 10 and 30 ft lamberts. Adjacent measurements shall not exceed a 1.5:1 ratio.

4.8.4.5 Rain Test. A rain test shall be conducted for Style 1, 2, 3, and 5 signs in accordance with MIL-STD-810, Procedure I. The sign shall be operated during the last 10 minutes of the test. Failure of the sign to operate shall be cause for rejection. If water enters the sign during the test, the sign shall be designed to drain the water quickly and circuit components shall not be mounted below the water line. The presence of water inside the sign shall not change the electrical load of the sign.

4.8.4.6 Low Temperature Test. A low temperature test shall be conducted for the signs, including any required adapter units for lighted signs, in accordance with MIL-STD-810, Procedure I. The lowest operating temperature shall be -20 C for Class 1 signs and -55 C for Class 2. With the sign temperature stabilized at the lowest temperature, the sign face shall be inspected for any damage including cracking, peeling, delaminating, and flaking. This or any other structural damage of the equipment shall be cause for rejection. Failure to operate or failure to reach normal sign illumination within 2 minutes after it is energized shall also be cause for rejection. The sign shall be restabilized at the lowest temperature after examination.

4.8.4.7 High Temperature Test. A high temperature test shall be conducted for the signs, including any required adapter units for lighted signs, in accordance with MIL-STD-810, Procedure II. The maximum chamber temperature in Step 7 shall be +55 C. This test shall immediately follow the low temperature test of 4.8.4.6. The high temperature chamber shall be preheated and stabilized at the maximum chamber temperature. The sign shall be transferred quickly from the low temperature chamber to the high temperature chamber. With the sign temperature stabilized at the maximum chamber temperature, the sign face shall be inspected for any damage including cracking, peeling bubbling delaminating, and flaking. This or any other structural damage of the equipment shall be cause for rejection. Failure of a sign to operate shall also be cause for rejection. After the sign cools to ambient temperature, the sign face shall be reinspected. Any damage shall be
cause for rejection.

4.8.4.8 Immersion Test. A water immersion test shall be performed on the adapter unit in accordance with MIL-STD-810, Procedure I. Evidence of water leakage shall be cause for failure. This test shall be conducted after the unit has been subjected to the high temperature test in 4.8.4.6 to ensure that the efficacy of the gasket material was not impaired.

4.8.5 Production Test. All production sign legend panels shall be inspected for compliance with all dimensions described herein. Retroreflective material shall appear to be smooth and be free of any aberration (except at the panel joints of modular signs). Panel joints of modular signs shall be observed to ensure that they not interfere with the legibility of the sign.

5. UNLIGHTED SIGNS (Applies to Style 4 signs only)

5.1 Construction. The sign panel shall be constructed of aluminum and shall be designed for installation on stakes or a concrete pad. All required mounting hardware, except anchor bolts, shall be supplied with the sign.

5.1.1 Materials and Components. Panels shall be fabricated from aluminum sheets. The sheet shall be free from laminations, blisters, open seams, pits, holes, or other defects. The thickness shall be uniform and the blank commercially flat. Mounting hardware shall be suitable for the signs' intended purpose and adequately protected against corrosion. All sign screws, bolts, nuts, and washers, shall be 18-8 stainless steel. Where applicable, an insulating material shall be placed to prevent contact between aluminum and steel material. Retroreflective material shall meet the color and reflectivity requirements of ASTM D4956, Type III or Type IV sheeting.

5.1.2 Sizes. The dimensions of the signs shall be in accordance with Table 2. Sign lengths shall be chosen to accommodate only complete message elements. When required, a sign array may contain multiple signs of the same size (mounting height and face height) installed end-to-end on a straight line. When multiple signs are used, the separation distance between legend panels shall be 3 to 6 inches (76 to 152 mm). See Appendix 4 for examples of sign arrays.

Table 2. Sign Dimensions

Size	Legend Height		Legend Panel Height		Overall Mounting Height		Maximum Overall Sign Length		Minimum Sign Length	
	Inches	mm	Inches	mm	Inches	mm	Inches	mm	Inches	mm
1	12	300	18	460	24-30	610-760	120	1524	30	762
2	15	380	24	610	30-36	760-910	145	1829	36	914
3	18	460	30	760	36-42	910-1070	170	2134	42	1067

NOTE: Legend heights for Runway Safety Area/Obstacle Free Zone (OFZ) and Runway Approach Area Boundary; ILS Critical Area Boundary; and No Entry signs are specified in Appendix 2, Tables I, II, and III, respectively.

5.1.3 Mounting Legs. Mounting legs for each sign shall have frangible points located 2 inches (51 mm) or less above the concrete pad or stake. The legs shall be mounted to the back of the sign, or in a manner which does not obstruct any portion of the sign front. The frangible points for mode 1 signs shall withstand wind loads due to jet blasts of 100 mph (161 km/h), but will break before reaching an applied static load over the legend panel of 0.9 psi (6.21 kPa). The mode 1 signs must withstand 100 mph winds and jet blast/prop wash from aircraft without bending or changing shape. The frangible points for mode 2 signs shall withstand wind loads due to jet blasts of 200 mph (322 km/h) but will break before reaching an applied static load over the legend panel of 1.3 psi (8.96 kPa). The mode 2 signs must withstand 200 mph winds and jet blast/prop wash from aircraft without bending or changing shape.

5.1.4 Sign Faces. The sign background, except for black, shall consist of retroreflective sheeting. The sheeting shall be applied to signs prepared in accordance with the recommendations of the retroreflective sheeting manufacturer. The sign panel with the sheeting shall be finished, free of cracks, wrinkles, blisters, and warps, and shall present a smooth surface of uniform color. All units of the sign message shall be formed to provide a continuous stroke width with smooth edges and shall present a flat surface free from warps, blisters, wrinkles, and burrs. The background and legend color shall be as specified for each type of sign. The sign face shall be constructed by the direct applied characters process or the screen process in accordance with 5.1.4.1 and 5.1.4.2, respectively. The spacing, stroke, and shape of legend characters, numerals, and symbols shall be in accordance with Appendix 1 and 2 of this specification. Type L-858L sign faces shall have a margin and a border in accordance with paragraphs 5.1.4.3 and as shown in Appendix 4, Figures 1 and 2. Message dividers shall be in accordance with paragraph 5.1.4.4. Corners of sign faces shall be rounded to a radius of 1-1/2 inches +/- 1/8".

5.1.4.1 Direct Applied Character Process. Letters, numerals, symbols and border of the sign shall be cut from retroreflective sheeting and shall be applied in accordance with the manufacturers recommendations.

5.1.4.2 Screen Process. Letters, numerals, symbols, and border of sign shall be applied to the retroreflective sheeting or opaque background of sign by direct or reverse screening. The sign message for Type L-858Y shall be applied to retroreflective sheeting by direct screening process. Sign message for Type L-858L and Type L-858R shall be produced by the reverse screening process.

5.1.4.3 Margin and Border for Type L-858L Signs. The sign faces of Type L-858L signs shall have a continuous border 12/16 inch (21 mm) wide for Size 1; 1-1/16 inches (27 mm) wide for Size 2; and 1-1/4 inches (32 mm) wide for Size 3 signs. The border shall be the same color as the legend. The border shall be set in from the edge of the sign to yield a continuous margin 11/16 inch (17 mm) for Size 1; 1-7/16 inches for Size 2; and 2 inches for Size 3 signs. The horizontal distance from the edge of a character or numeral to the inside edge of the border shall be as specified in Appendix 1, Table VIII, for the appropriate sign size. This distance may be increased, if necessary, to meet the minimum sign length specified in Table 2. The border shall be square at each corner of the sign (see Corner Detail, Appendix 4, Figure 2).

5.1.4.4 Message Dividers. Vertical message dividers shall be used to separate the message elements (e.g., ``C->", ``<-T->", ``15-APCH", etc.) of a sign array, as shown in Appendix 3, Figures 1, 2, and 4. Message dividers shall not be used to separate Type L-858L signs from Type L-858Y or Type L-858R signs when they are collocated. Message dividers shall be 1-5/16 inches (33 mm) in width for size 1; 1-11/16 inches (43 mm) for size 2; and 2 inches (51 mm) for size 3 signs. Message dividers shall extend from the top to the bottom of the legend panel. Message divider color shall be the same as that of the legend.

5.2 Finish. The back panel of the sign shall be painted with a primer coat and low luster, flat black, finish coat or covered with black scotch cal sheeting.

5.3 Frangible couplings. Each frangible coupling shall be permanently marked with the manufacturer name (which may be abbreviated) and size of sign for which the coupling is intended.

5.4 Workmanship. The sign shall be fabricated such that all sharp edges and burrs are removed. Painted surfaces shall be free from runs, blotches, and scratches.

5.5 Instruction Guide. An instruction guide, with sign installation details and a parts list, shall be included with each order of signs.

5.6 QUALITY ASSURANCE PROVISION. In order to be eligible for installation under the Airports grant program, manufacturers of unlighted signs are required to furnish proof from a testing laboratory to the airport owner, or the owner's representative, that the sign conforms to the following provisions:

5.6.1 Guarantee. The manufacturer shall agree to provide each customer with the following guarantee. The sign has been manufactured in accordance with the specification and any defect in material or workmanship which may occur within 2 years from installation will be corrected or replaced by the manufacturer at no cost to the airport owner.

5.6.2 Tests.

5.6.2.1 Visual Inspection. For this test, Type L-858Y signs shall have at least two message elements separated by a message divider; Type L-858R signs shall have a legend which reads ``18-36"; and Type L-858L signs shall have a legend which reads, e.g., ``B" . The signs shall be examined for compliance with the requirements for dimensions, materials, finish, and quality of workmanship. The signs shall be viewed in daylight and at nighttime from a distance of 800 ft (244 m). The sign type, as defined in paragraph 1.2.1, should be readily identifiable. The sign face and retroreflective material shall appear to be smooth and shall be free of any aberration (excepting minor seams between retroreflective sheets) and sharp edges.

5.6.2.2 Wind Load and Frangibility Test. The signs shall be tested for their ability to withstand loads of 100 mph (161 km/h) for mode 1 and 200 (322 km/h) for mode 2 without damage. The test shall be performed with the sign completely assembled and mounted by the base. If the loading is applied with the sign mounted on a vertical surface, the weight of the sign shall be included as part of the total applied weight. The test shall be designed to ensure the legend panel receives the full load. A static load of .23 psi (1.59 kPA) for mode 1 and .9 psi (6.21 kPa) for mode 2 shall be applied uniformly over the entire surface of the legend panel for a period of 10 minutes. The sign shall not break at the frangible points nor suffer permanent distortion. The static load shall then be increased until the sign breaks at the frangible points. The breaking shall occur before the loading reaches an applied static load over the legend panel of .9 psi (6.21 kPa) for mode 1 and 1.3 (8.96 kPa) for mode 2. The legend panel and panel supports shall then be inspected for evidence of damage. Any breakage or permanent deformation shall be cause for rejection.

5.6.2.3 Low Temperature Test. Signs shall be subjected to a temperature of -67F (-55C) (+/-2) for a period of 24 hours. Evidence of any damage including cracking, peeling, bubbling, delaminating, and flaking, shall be cause for rejection.

5.6.2.4 High Temperature Test. Signs shall be subject to a temperature of 131 F (55 C) for a period of not less than 7 hours. Evidence of any damage including cracking, peeling, bubbling, delaminating, and flaking, either during test of after cooling shall be cause for rejection.

5.6.2.5 Solar Radiation. A sunshine test shall be conducted in accordance with MIL-STD-810, Method 505.2, Procedure II. The sign shall be subjected to a minimun of five cycles. At the conclusion of the test, any evidence of cracking peeling, bubbling, flaking, delaminating or corrosion shall be cause for rejection.

5.6.2.6 Production Testing. All production sign legend panels shall be inspected for compliance requirements for dimensions, materials, finish, and quality of workmanship. Retroreflective material shall be inspected to ensure that it is smooth and free from aberration.S